Atlantic Billfish Fishery Management Plan Amendment

Chapter 2
Description of Atlantic Billfish Fisheries

2.1 Atlantic Billfish Fishery

2.1.1 Status of the Stocks

The most recent ICCAT stock assessment for Atlantic blue and white marlin was held in Miami, Florida, during July 1996. Stock abundance estimates for Atlantic billfish were based on non-equilibrium production models using catch per unit of effort data. The general results from these analyses indicated that biomass of Atlantic blue marlin and Atlantic white marlin has been below the biomass necessary to produce maximum sustainable yield (B_{MSY}) for about three decades under both total Atlantic (Figures 2.1.1 and 2.1.2, respectively), and north Atlantic (Figures 2.1.3 and 2.1.4, respectively) stock hypotheses (SCRS, 1997). Atlantic blue marlin relative biomass for the total Atlantic Ocean in 1996 was estimated to be about 24 percent of B_{MSY}. The 1996 observed yield was 4,439 mt with a 1996 replacement yield of 1,920 mt, a relative biomass (B_{1996} /B_{MSY}) of 0.236, and a relative fishing mortality (F_{1995} /F_{MSY}) of 2.87 (80 percent confidence interval: 1.45-3.41). Under the blue marlin North Atlantic hypothesis, maximum sustainable yield was 1,963 mt, with an observed yield for 1996 of 1,870 mt and replacement yield of 1,694 mt. Relative biomass was estimated to be 0.608, with a relative fishing mortality in the North Atlantic of 1.21 (80 percent confidence interval: 0.96-1.56).

Atlantic white marlin assessments similarly indicated that resources in the Atlantic were over-exploited, with white marlin relative biomass for the total Atlantic Ocean for 1996 estimated to be about 23 percent of B_{MSY}. The maximum sustainable yield for white marlin in the total Atlantic was 2,177 mt. The observed yield in 1996 was 1,508 mt with a replacement yield of 921 mt, a relative biomass (B_{1996} /B_{MSY}) of 0.226, and a relative fishing mortality (F_{1995} /F_{MSY}) of 1.96 (80 percent confidence interval: 1.33-2.91). Under the white marlin North Atlantic hypothesis, observed yield for 1996 was 443 mt, with a replacement yield of 301 mt. Relative biomass was estimated to be 0.321, with a relative fishing mortality of 2.37 (80 percent confidence interval: 1.60-8.41).

The 1996 ICCAT Billfish Workshop did not update the 1993 west Atlantic sailfish stock assessment; however recent trends indicate that the relative biomass (Figure 2.1.5) since 1990 has been near or less than B_{MSY} (SCRS, 1997). Analyses indicated that sailfish biomass had declined to fully exploited or over-exploited. In the western Atlantic, sailfish biomass was estimated to be at 62 percent of the biomass needed to produce maximum sustainable yield (MSY = 700 mt in the western Atlantic). The observed yield in 1996 was 886 mt with a current (1992/96) replacement yield of 600 mt, a relative biomass (B_{1996} /B_{MSY}) of 0.62, and a relative fishing mortality ($F_{1991/95}$ /F_{MSY}) of 1.4. Longbill spearfish and sailfish landings have historically been reported together in annual ICCAT landing statistics, although the preponderance of the landings were most likely sailfish. Due to the paucity of data on longbill spearfish, the SCRS has not completed an assessment of these stocks in the Atlantic Ocean.

2.1.2 International Aspects of the Atlantic Billfish Fishery

Atlantic billfish have historically been landed as the incidental catch of foreign and domestic commercial pelagic longline vessels, or in directed recreational and subsistence handline fisheries. Since the majority of billfish fishing mortality in the Atlantic Ocean is part of international commercial pelagic fisheries (Figures 2.1.6, 2.1.7 and 2.1.8; Appendix C, Tables 1, 2 and 3), billfish catch estimates have risen and fallen with the overall catch estimates for pelagic fisheries. Recorded Atlantic blue marlin landings (Figure 2.1.9) were at their peak (9,000 mt) in 1963, after which they declined and stabilized through the late 1970s (2,000 - 3,000 mt). From the late 1970s through the late 1980s, landings declined again to generally between 1,300 - 2,700 mt, until beginning a pattern of increase and fluctuation (3,000-4,400 mt) from 1989 through the mid-1990s. White marlin landings in the North Atlantic (Figure 2.1.10) have followed a fluctuating pattern similar to blue marlin landings. Total reported landings in the Atlantic for white marlin peaked in 1965 at 5,000 mt, declining and fluctuating to 900 mt by 1980. Those numbers have risen and fluctuated between 1,300-1,900 mt over the past ten years. Atlantic longline catches of sailfish and longbill spearfish have been reported together in ICCAT landing statistics (except for Japan since 1994), therefore these species have been summarized together in Figure 2.1.11. Landings for sailfish/spearfish reached a peak in the Atlantic of almost 3,000 mt in 1965, then declined to about 1,600 mt in 1973. In 1976, sailfish/spearfish landings reached a historical peak of over 6,000 mt, and have since fluctuated between 2,000 to 4,000 mt. In the western Atlantic, sailfish/spearfish landings have remained relatively stable, at nearly 1,000 mt since 1973.

2.1.2.1 Participating Nations

Atlantic blue marlin, white marlin and sailfish are a highly-prized recreational species in the United States, Venezuela, Bahamas, Brazil and many countries in Caribbean Sea and west coast of Africa. Many countries have also landed them for consumption from incidental catches to directed commercial longline fisheries. The directed effort is principally targeted toward tuna species and swordfish; however, billfish occur in the same area as these other pelagic species, making them susceptible to this gear. Because billfish are largely daylight feeders, they tend to be associated more with tuna catches rather than swordfish. Nations currently fishing throughout the Atlantic for tuna and swordfish, and reporting catches of Atlantic billfish are Chinese Taipei[1], Japan and Korea. Countries reporting catches of billfish from the north Atlantic management area (for blue marlin and white marlin) include Barbados, Cuba, Spain, Grenada, Netherlands-Antilles, Trinidad and Tobago, United States and Venezuela. In the south Atlantic, billfish catches have recently been reported by Brazil, Brazil-Taiwan (a joint-venture between the countries of Brazil and Taiwan), Cote d'Ivoire and Ghana in addition to those countries fishing throughout the Atlantic. Countries reporting catches of sailfish and longbill spearfish from the western Atlantic management unit include Barbados, Brazil, Brazil-Taiwan, Dominican Republic, Grenada, Korea, Trinidad and Tobago, United States and Venezuela (SCRS, 1997).

2.1.2.2 Fishing Areas

[1]Chinese Taipei is used by ICCAT to designate the cooperative efforts of China and Taiwan.

Pelagic longline fishing by foreign vessels within the U.S. Atlantic EEZ is not permitted. The foreign longline fishery operates throughout the range of Atlantic billfish outside of the U.S. EEZ (Sections 1.3 and 4.1), with fishing efforts concentrated in areas of highest billfish abundance (Section 4.2).

2.1.2.3 Enumeration of Catches as Distributed Among the Stocks Comprising the Management Unit.

A total of 27 different countries have reported catches[2] of blue marlin from the Atlantic Ocean (Appendix C) since 1963; 21 countries in the north Atlantic and 13 in the south Atlantic (7 countries fished both areas) reported blue marlin catches. The combined reported catches of blue marlin from the total Atlantic, north and south Atlantic are shown in Figure 2.1.9. Historically, Japan was responsible for nearly 95 percent of the blue marlin catches through 1996, peaking in 1963 with 8,600 mt (4,759 mt in the north Atlantic and 3,841 mt in the south Atlantic). During the 1970s and 1980s, Japan, Cuba, Korea, Chinese Taipei and the United States dominated catches in the north Atlantic, accounting for nearly 80 percent of all blue marlin caught. In 1996 (year of most recent complete data), Japan (42.5 percent), Chinese Taipei (13.7 percent) and the United States (12.4 percent, including recreational landings and longline dead discards) reported the highest catches. In the south Atlantic during the late 1960s and 1970s, blue marlin were caught most frequently by Japan, Cuba, Chinese Taipei and Korea (approximately 90 percent), with catches from Japan dropping off after 1973. During the 1980s, Japan increased its participation in the south Atlantic, along with Cote d'Ivoire. Most recently, Chinese Taipei, Cote d'Ivoire, Ghana, Japan and Brazil-Taiwan have accounted for over 80 percent of the increasing catches of blue marlin. Total Atlantic catches of blue marlin (Table 2.1.1) were highest for Japan (39.3 percent) and Chinese Taipei (15.2 percent) in 1996.

White marlin catches have been reported by 33 different countries in the Atlantic since 1963 (Appendix C). The combined reported catches of white marlin from the total Atlantic, north and south Atlantic are shown in Figure 2.1.10. As noted for the blue marlin, Japan was responsible for nearly 95 percent of all white marlin caught in the Atlantic Ocean during the 1960s, with a peak catch of 4,631 mt in 1965 (1,913 mt in the north Atlantic and 2,718 mt in the south Atlantic). In the north Atlantic, 16 countries have reported catches of white marlin, with Chinese Taipei, Japan, Cuba, Venezuela, Korea and the United States (recreational landings and commercial discards after 1988) reporting the highest catches during the 1970s and 1980s. In 1996, Chinese Taipei (25.5 percent), Venezuela (21.7 percent) and Japan (18.3 percent) provided the greatest catch of white marlin in the north Atlantic. Japan, Korea, Chinese Taipei and Brazil were the most frequent countries of the 17 reporting catches of white marlin in the south Atlantic. After Japan reduced catches of white marlin in the south Atlantic in 1973, Korea,

[2]Catches are defined as reported landings by ICCAT members and non-members; the U.S. reports both dead discards from commercial fishing efforts and estimated landings from recreational fisheries. The sum of these values is the U.S. "catch" reported by ICCAT.

Chinese Taipei and Cuba were responsible for nearly 90 percent of the landings. Total Atlantic catches of white marlin (Table 2.1.1) were highest for Chinese Taipei (37.5 percent) and Gabon (26.9 percent) in 1996.

A total of 32 countries have reported catches of Atlantic sailfish and spearfish from the Atlantic (Appendix C). The combined reported catches of sailfish and spearfish from the total Atlantic, east and west Atlantic are shown in Figure 2.1.11. In the eastern Atlantic, 14 countries have reported catches of sailfish and spearfish, with Japan reporting the highest catches during the 1960s, being replaced by much higher catches by Ghana during the 1970s and 1980s (peak of 4,726 mt in 1975). Since the late 1980s, catches of sailfish and spearfish have fluctuated around 2,500 mt, with the largest catches during the 1990s coming from Senegal, Ghana and Cote d'Ivoire. A total of 25 countries have reported catches of sailfish and spearfish from the western Atlantic, including Japan, Korea, Brazil, United States, Venezuela, Dominican Republic, Cuba and Chinese Taipei. The top three countries during 1996 (Table 2.1.1) were Brazil (29.7 percent), Venezuela (16.7 percent), and Trinidad and Tobago (11.3 percent).

2.1.2.4 Interactions Between Foreign and U.S. Participants

Title II of the Magnuson-Stevens Act establishes the system for the regulation of foreign fishing within the U.S. EEZ. Regulations provide for the setting of a total allowable level of foreign fishing (Section 1.6) for specific species based on the portion of the optimum yield not utilized by U.S. vessels. At the present time, no TALFF is available for Atlantic billfish since commercial possession has been prohibited in the U.S. EEZ as a result of the 1988 FMP, thus there is no portion of optimum yield available for foreign vessels. In addition, ICCAT has capped landings of Atlantic blue and white marlin through 2000 at 75 percent of 1996 levels.

The 1988 Atlantic Billfish FMP described competition for billfish resources between the U.S. recreational fishery and foreign commercial fisheries. Although the gear conflicts with foreign longline gear within the U.S. EEZ have been resolved since that time, the issue of billfish catches by foreign fisheries and the resultant impact on the status of the stock is still a concern to U.S. fishery managers and all stakeholder groups. The relative biomass estimates for blue marlin (Figure 2.1.1) indicate that the stock in the total Atlantic has not improved, but has continued to decline since the 1988 FMP. The condition of the white marlin under both the total and north Atlantic stock scenarios has continued to degenerate to historically low levels (Figures 2.1.2 and 2.1.4). West Atlantic sailfish resources are near or below the level associated with B_{MSY} (Figure 2.1.5); however, any expansion of foreign longlining effort could further reduce the availability of these billfish resources to U.S. fishermen. Recent ICCAT quota reductions for directed species such as swordfish, bigeye tuna, and southern albacore may result in lower longline effort and perhaps resulting in a reduction in billfish bycatch by those fleets (Section 3.5). Continued efforts to promote sustainable fisheries at the international level are a critical component of Atlantic billfish management.

All member countries of ICCAT must begin to reduce blue marlin and white marlin landings by at least 25 percent beginning in 1998, to be completed by the end of 1999, to be in compliance

with the 1997 ICCAT recommendation. This is the first action by ICCAT to reduce landings of billfish in the Atlantic Ocean, and is just an initial step in rebuilding these over-exploited stocks. In 1998, ICCAT adopted a recommendation delaying the Atlantic marlin stock assessment until 2000, when the impact of the 25 percent reductions initiated in 1997, and completed in 1999, can be evaluated. The SCRS will then develop rebuilding scenarios to levels that support maximum sustainable yield, if the available information supports these analyses; similar management actions may follow the 2001 SCRS stock assessment for west Atlantic sailfish.

2.1.3 Domestic Aspects of the Atlantic Billfish Fishery

In waters off of the continental United States, the primary traditional use of Atlantic billfish resources has been in recreational fisheries since the early 1900s, with a significant increase in participation after World War II. Until the early 1950s, the fishery was concentrated in only a few areas along the Atlantic and Gulf Coasts. Largely as a result of improvements in offshore sport fishing vessels and equipment, there has been rapid expansion in both the number of anglers and the fishing grounds utilized. A more expanded summary of the history of billfish angling is provided by Gillis and Ditton (1998). Fisheries in waters off Puerto Rico, in addition to a recreational fishery, traditionally included a small-scale, handline subsistence fishery. With the exception of a small harpoon fishery for white marlin that used to exist in the waters off of southern New England, there have been no directed commercial activities for billfish. However, billfish caught incidentally in commercial fisheries were marketed prior to the late 1980s, and were usually processed and sold as smoked fish product.

In 1988, the South Atlantic Fishery Management Council, in cooperation with the Caribbean, Mid-Atlantic, New England, and Gulf of Mexico Fishery Management Councils, prepared an FMP for Atlantic billfish, which prohibited retention, landing, or sale of billfish caught by commercial fishing vessels in U.S. waters, thereby reserving this resource for recreational anglers. The 1988 FMP required that all Atlantic billfish caught on commercial gear shoreward of the outer boundary of the EEZ must be released "in a manner that will ensure maximum probability of survival," by cutting the line near the hook without removing the fish from the water. These measures are currently still in effect. A summary of the number of billfish incidentally caught on pelagic longline gear during 1995 is provided in Table 2.1.2, along with the percentage of billfish released alive, by area, for the 1995 longline fishery. Long-term survival of billfish from longline gear is unknown; however, billfish tagged and released alive from commercial gear have been recaptured after extended periods of release (Section 4.3.1).

Conservation of Atlantic billfish resources was a primary objective of the 1988 Atlantic Billfish FMP in order to maintain the highest availability of billfish to the U.S. recreational fishery. The FMP set minimum size limits for the recreational retention of Atlantic billfish species at 86 inches LJFL for blue marlin, 62 inches LJFL for white marlin, and 57 inch LJFL for west Atlantic sailfish; no minimum size limit for was established for longbill spearfish. The minimum sizes for retention were generally above minimum size of maturity, except for sailfish. The March 24, 1998, (63 FR 14030) interim rule increased the minimum size to 96 inches LJFL for blue marlin, and 66 inches LJFL for white marlin. The interim rule was extended September 29, 1998, (63 FR 51859) with an additional increase in the minimum size for blue marlin to 99 inches LJFL and institution of a one marlin per vessel per trip bag limit. The recreational fishing community has actively encouraged its members to release their live billfish catches, so as to better conserve the resource for future anglers. Fisher and Ditton (1992) estimated that 89 percent of all billfish caught by anglers who participate in tournaments are released (whether or not that fish was caught during a tournament), depending upon area fished (Table 2.1.3). However, there are few statistically-valid estimates of the survival rate of billfish that have been caught and released in recreational fisheries, making estimates of fishing-induced mortality

difficult to assess. The few studies evaluating release mortality rates are summarized in Section 3.4 and 3.5.

2.1.3.1 Participating User Groups

In the United States, Atlantic blue marlin, white marlin, west Atlantic sailfish, and longbill spearfish can be landed only by recreational fishermen fishing from either private or charterboats. Fisher and Ditton estimated that there were 7,915 U.S. tournament billfish anglers. More recently, Ditton and Stoll (1998) reported in summarizing an analysis by the American Sportfishing Association of the 1991 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, that 230,000 anglers in the United States spent 2,136,899 days fishing for various billfish species. They noted that the ten states with the highest number of billfish anglers were: 1. Florida (159,575); 2. California (31,162); 3. North Carolina (30,071); 4. Hawaii (26,588); 5. Texas (23,714); 6. New Jersey (17,687); 7. New York (12,671); 8. South Carolina; 9. Maryland (9,959); and 10. Delaware (8,666).

Recreational angling for Atlantic billfish can be sub-divided into tournament and non-tournament trips. The number of vessels range from 5 to 150 per tournament, with the number of anglers ranging from 10 to 1,000 per tournament (Avrigian, pers. comm.). Fisher and Ditton (1992) completed an extensive mail survey of 1,984 billfish tournament anglers, and estimated that there were 7,915 U.S. tournament billfish anglers in the western Atlantic Ocean during 1989. The participants in the billfish fishery from their study were generally college-educated males, with a mean age of 46, median household income of $115,000 and more than 11 years of experience fishing for billfish. The economic and social characteristics of participants are discussed in further detail in sections 2.1.4 and Chapter 5, respectively.

2.1.3.2 Tournament Fishing

There are approximately 300-400 billfish tournaments per year along the U.S. Atlantic coast (including the Gulf of Mexico and Caribbean). Offshore fishing tournaments target blue marlin, with other categories for white marlin, sailfish, tuna (generally yellowfin tuna), dolphin-fish (mahi mahi) and wahoo, generally by high-speed trolling. Sailfish tournaments, which are found almost exclusively in south Florida and the Florida Keys, operate closer to shore than most billfish tournaments and fish mostly with live bait. Billfish tournaments may be categorized into three general types. Fishing organizations support club series tournaments and usually award trophies for various angling categories. Club series tournaments can last from a single weekend event to an entire fishing season. Commercial concerns, such as restaurants, Chamber of Commerce, group of charterboat captains or marinas, can sponsor rodeo and promotional tournaments. In addition, there are high profile tournament events which are characterized by large vessels and big prizes. Tournament entry fees range from $20 to $8,000, with the high-profile events being the most expensive. Fisher and Ditton (1992) found the average tournament fee in 1989 was $546. Additional estimated expenditures of $1,600 per angler per tournament, included loading, boat operation, food, bait and tackle, transportation, and captain/charter fees. Cash prizes range from $20 to more than $100,000. In August, 1997, the Pirate Cove Billfish

Tournament awarded $217,000 to the participant who landed a 670 pound blue marlin. Other prizes sometimes awarded include Rolex watches, fishing equipment, and even boats. Tournaments can also involve a calcutta, which generally consists of pool contributions from a group of tournament participants. The calcutta is subsequently won by a member of the group who catches-and-releases, or lands the largest, or most fish.

2.1.3.3 Fishing Areas and Seasons

Sport fishing for billfish on private recreational and charterboat is conducted in nearly all warm water ocean areas, generally in relatively deeper waters of tropical and subtropical areas. The recreational U.S. Atlantic billfish fishery is concentrated from Massachusetts to North Carolina, southeast Florida, the northern Gulf of Mexico and the Caribbean (including Puerto Rico and the U.S. Virgin Islands), depending upon the species and season. Blue marlin are most abundant off the mid-Atlantic coast in the summer, off the east coast of Florida and Bahamas in the spring, off Puerto Rico and the Virgin Islands in the summer and fall, and off the Florida Keys in the fall. White marlin are available to the recreational sport fisheries in the Gulf of Mexico from June into October, with peak abundance in the northern Gulf in July and August (Browder and Prince, 1990). The northeastern limit of the summer coastal occurrence of white marlin is off Nantucket Island, south of eastern Cape Cod. Spring is the peak season for sport fishing for white marlin in the Straits of Florida, Bahamas, Puerto Rico and the Virgin Islands. Most of the recreational fishing effort for billfish along the U.S. Atlantic coast, Gulf of Mexico, and in the Caribbean Sea is concentrated either around key ports, fishing centers, or billfish tournaments (Prince *et al*., 1990), in relatively deep waters from 120 ft to 6,000 ft (Lucy *et al*., 1990).

2.1.3.4 Domestic Conflicts

There are four basic areas of conflict that have been identified between recreational and commercial fishermen for Atlantic billfish resources: (1) gear conflicts, i.e., interference with the fishing operation of one user group by another; (2) conflicts that arise from real or perceived competition for the resource; (3) conflicts between user-groups arising from the need to share limited resources that are highly migratory and range well beyond the jurisdiction of any one nation; and (4) basic conflicts between user-groups based on fundamental philosophical differences in the goals in the use of the resource. The prohibition of commercial landings of billfish by the 1988 Atlantic Billfish FMP has resulted in a reduction of some of the conflicts between recreational and commercial fishermen. However, regulatory dead discards of Atlantic billfish in the pelagic longline fishery continue to be a basis of conflict between recreational and commercial fishermen. Billfish bycatch in the U.S. longline fleet has been estimated using data from mandatory pelagic logbooks. Observer data are used to scale logbook-reported encounters to provide a more accurate assessment of billfish bycatch. Estimates of the billfish dead discards in the U.S. commercial longline fishery for 1996 were 196.6 mt for blue marlin, 67.6 for white marlin and 71.6 mt for west Atlantic sailfish, and for 1997, 138.1 mt, 70.8 mt and 57.7 mt, respectively (Table 2.1.4). In comparison, minimum estimates of recreational landings in 1996 for blue marlin were 34.9 mt, 3.3 mt for white marlin and 1.1 mt for sailfish, and in 1997, 45.1

mt, 1.8 mt, and 0.6 mt, respectively (Table 2.1.4). Commercial discard rates (live + dead) of all billfish species combined are shown in Figure 2.1.12.

The level of recreational Atlantic billfish landings is a source of conflict. Commercial fishermen argue that recreational landings are under-reported, particularly from non-tournament sources. There is concern by the commercial community that Atlantic billfish mortality associated with catch and release is significant and should be included in determining the impact of recreational fishing. The relative magnitude of the recreational catch to commercial catch (landed until 1990 and incidental afterwards) is shown for blue marlin and white marlin in Figures 2.1.13 and 2.1.14, respectively. The incidental catch of Atlantic blue marlin, Atlantic white marlin, west Atlantic sailfish and longbill spearfish is summarized, by area for 1995, in Table 2.1.5. Blue marlin represented 0.49 percent of the total number of fish caught by longline gear. They were caught most frequently in the Caribbean (3.33 percent of the catch) and Offshore South (2.78 percent), but were rarely encountered off the Grand Banks or Northeast Coastal areas. White marlin represented 0.49 percent of fish caught by the 1995 longline fishery. Sailfish and longbill spearfish are less frequently encountered by longline gear (0.2 percent and 0.07 percent of the 1995 longline catch, respectively), and are generally found in the Gulf of Mexico, southeast coastal and southern offshore regions.

Another commercial-recreational conflict relates to the claim that if tournaments require landing billfish in order to claim a prize, this constitutes "trade, barter or sale" of billfish landings. Some components of the commercial pelagic longline fishery feel that cash/merchandise prizes in association with billfish tournaments should be eliminated to reduce the economic incentive to land an Atlantic billfish. The regulations state that the sale or purchase of billfish from its management unit is prohibited (50 CFR 635.31). A survey of tournament rules has shown that a billfish is not required to be given to the tournament to qualify for a prize, rather the fish only is subject to a measurement of its weight. The fish is ultimately retained as the property of the individual submitting the fish for entry in the tournament, therefore no purchase, barter, or sale of the billfish has occurred and the regulations have not been violated. However, the 1988 Atlantic billfish FMP did consider requiring all tournaments to be catch-and-release only (i.e. no-kill tournaments). Although this no-kill alternative was rejected at the time, the FMP did encourage all tournaments to move toward an all-release format. Many tournaments have subsequently adopted this approach, are well-attended, with considerable economic impacts.

Another source of conflict in the domestic Atlantic billfish fishery is the development of management strategies in consideration of the highly migratory nature of billfish, particularly blue marlin and white marlin, and the fact that such a small percentage of the stock occurs at any point in time within the U.S. EEZ (Table 2.1.6). Regulatory actions taken unilaterally by the United States, no matter how restrictive, may not have a substantial impact on the conservation of these species (Orbach, 1990); however, the role of management actions taken by the United States and their impact on international negotiations through ICCAT must also be considered. The first-ever binding recommendation for conservation of billfish resources in the Atlantic (25 percent reductions in landings and improved monitoring) was made by ICCAT in 1997, largely

due to the cooperative nature of U.S. recreational and commercial concerns as members of the U.S. delegation to ICCAT in negotiations with the international community.

2.1.3.5 Amount of Catches and Landings

Recreational catches (fish hooked and either released or retained) and landings (fish killed and brought back to shore) of billfish from private and charterboats are difficult to accurately assess because billfish are relatively rare in comparison with other species targeted by marine anglers, and because there are relatively few billfish fishermen relative to the vast number of marine recreational anglers. These characteristics challenge the use of traditional recreational angler surveys for monitoring billfish catches. Recreational landings of billfish by U.S. billfish anglers are estimated by a combination of billfish tournament intercepts (RBS), mandatory reporting by tournaments selected by the Science Director, and the Large Pelagic Survey. The total reported recreational landings for blue marlin and white marlin, and incidental longline dead discards are summarized in Figures 2.1.13 and 2.1.14, respectively. Reported U.S. recreational landings of Atlantic blue marlin, Atlantic white marlin and west Atlantic sailfish for 1995, 1996 and 1997 are shown by geographic area in Table 2.1.4.

The 1996 billfish assessment (SCRS, 1996) included a relative index of rod and reel catches per unit effort (CPUE) of blue marlin and white marlin caught in the United States from 1973 to 1995 (Figure 2.1.15). Although absolute catches can not be obtained from these analyses, trends in U.S. catches of these species, over time, can be delineated. CPUE for blue marlin has continued to increase since 1973, with some minor fluctuations, with the greatest increases occurring during the last two years of the time series. CPUE for white marlin has been relatively stable during the 1990s. The recreational fishery has tended to target bigger blue marlin, necessitating the use of larger baits trolled at faster speeds which may have increased blue marlin CPUE estimates and decreased estimates of white marlin catch.

During the 1997 billfish tournament season in the Gulf of Mexico, there were 1,010 billfishes reported as hooked; 132 were kept, 388 were released (only 8.5 percent were releases without being tagged) and 490 were hooked temporarily based on the Recreational Billfish Survey of 44 billfish tournaments (Avrigian pers. comm.). Of the 520 billfish reported as caught (i.e., kept or released) during the 1997 season in the northern Gulf of Mexico, about 59 percent were blue marlin, 29 percent were white marlin, 12 percent were sailfish, and less than 1 percent (N=3) were spearfish.

Fisher and Ditton (1992) estimated that there were 7,915 U.S. tournament billfish anglers in the western Atlantic Ocean during 1989, making a total of 102,895 billfish fishing trips (90 percent confidence interval = 6,512), including tournament and non-tournament participation. In 1989, these trips resulted in an estimated 42,301 billfish caught, consisting of 38 percent sailfish, 33 percent blue marlin, 29 percent white marlin, and less than 1 percent spearfish. They estimated that 5,541 billfish were landed (90 percent confidence interval = 715); of billfish landed, 59 percent were blue marlin, 24 percent were white marlin, 15 percent were sailfish, and approximately 2 percent were spearfish. In their survey targeting anglers who participate in

billfish tournaments, Fisher and Ditton reported that anglers make an average of 13 billfish trips per year. The number of trips over the survey year varied by region, with the maximum number taken in the Caribbean (17.3 per year), and the least in the Gulf of Mexico (8.7 trips per year). Billfish trips averaged 2.6 days, with each angler, on average, landing less than one billfish each year. The success rate also varied among regions (Table 2.1.7). The highest number of successful trips taken during the year of the survey, relative to the total number of trips taken, was in the mid-Atlantic region (45 percent of trips resulting in the catch of a billfish). Recreational billfish trips in the Gulf of Mexico were the least successful, with approximately 28 percent of trips resulting in the catch of a billfish. A total of 71 percent of the 1,171 anglers responding in the Fisher and Ditton study indicated that they did not land a billfish during the year of the survey, therefore 29 percent of anglers accounted for all angler-induced mortality. During 1989, it took an average of 6.3 days of fishing to boat a billfish. Mid-Atlantic anglers caught the most billfish per angler, and had the highest release rate (95 percent) and lowest retention rate per angler (Table 2.1.3). Gulf of Mexico anglers caught the fewest billfish per angler (0.83), and Caribbean anglers had the highest retention rate per angler.

2.1.3.6 Atlantic Billfish Recreational Landing Caps

The 1997 ICCAT recommendation to reduce Atlantic marlin landings by at least 25 percent from 1996 levels, beginning in 1998 and fully completed by 1999, effectively established a cap for U.S. recreational landings. The United States had monitored for many years a selected number of major billfish tournaments as a proxy for the total landings because the available information from other programs in the United States indicated that few billfish were landed external to these events. Data from the monitored tournaments are thus the best available estimate of the trend in landings. Data from these same tournament can be used to determine if 25 percent reductions in U.S. marlin landings have been achieved, but using these data for that purpose requires an assumption that the temporal pattern of landings by non-monitored recreational landings remains unchanged. In 1996, the amount of fish landed, as currently reported, by recreational anglers was 34.9 mt of Atlantic blue marlin and 3.3 mt of Atlantic white marlin. In response to the ICCAT recommendation, as required by ATCA, the United States implemented regulations. The United States implemented the recommendation for a period of 180 days through an interim rule published on March 24, 1998 (63 FR 14030), increasing the minimum size of blue marlin and white marlin that could be retained by U.S. recreational anglers to 96 inches lower jaw-fork length (LJFL), and 63 inches LJFL, respectively. The interim rule was extended and amended on September 24, 1998 (63 FR 51859) for an additional 180 days, with an additional increase in the minimum size of Atlantic blue marlin to 99 inches LJFL. The final FMP retains these landing cap levels, at least until the 2000 SCRS stock assessment, when ICCAT may recommend additional management measures.

2.1.4 Description of Economic and Social Characteristics of the Domestic Atlantic Billfish Fishery

2.1.4.1 Recreational Fishery

Billfish angling has a long history in the United States, with the first reported marlin being landed in 1903 (Gillis and Ditton, 1998). Billfish anglers are a small constituency compared to other marine or freshwater angler groups (Ditton and Stoll, 1998), with billfish angling being an activity pursued generally by anglers with relatively high incomes. Ditton (1996) described typical participants in billfish angling as white males in their forties, highly educated, with high annual household incomes (Table 2.1.9); billfish anglers tend to fish twice as frequently as those targeting other saltwater species. These results are similar to those found by Maiolo (1990) from a survey of U.S. billfish anglers participating in tournaments along the east coast, Gulf of Mexico and Caribbean (Puerto Rico and Bahamas). Most recreational anglers consider themselves to be strong advocates for conservation of Atlantic billfish resources.

Fisher and Ditton (1992) completed an inventory of 359 billfish tournaments held in 1989 along the U.S. Atlantic coast, including the Gulf of Mexico, as well as Puerto Rico and the U.S. Virgin Islands. A total of 1,984 billfish anglers were surveyed, with 1,171 anglers responding. Respondents reported spending an average of $1,601 (excluding tournament fees) for a billfish fishing trip (Table 2.1.10) that lasted an average of 2.59 days, with an average of 13 trips taken each year. The average amount spent annually on billfish tournament fees was $1,856, or $546 per tournament, giving a $2,147 total expenditure per angler per trip. The total annual expenditure estimates generated from the Fisher and Ditton study indicated that in 1989, billfish tournament anglers spent an estimated $180 million in attempting to catch billfish (tournament and non-tournament trips), giving an average equivalent expenditure of $4,242 for each fish caught or $32,381 for each billfish landed. Ditton (1996) reported that the annual net economic benefits for the group surveyed was over $2 million. Fisher and Ditton estimated that there were 7,915 U.S. tournament billfish anglers, which translates to a $262 annual consumer's surplus per billfish angler.

Ditton and Clark (1994) provided a description of the economics associated with recreational billfish anglers participating in at least one of 14 billfish tournaments held between August, 1991 and October, 1992 in Puerto Rico. A total of 885 resident (of an estimated 1,475 resident billfish participants) and 154 non-resident anglers (82 were from the mainland United States or U.S. Virgin Islands; 72 were from other countries) were surveyed. Trip expenditures per resident averaged $711 per trip (average of 21 trips/year) and $3,945 for non-resident anglers fishing in Puerto Rico (average 7 billfish trips/year in Puerto Rico). Resident angler expenditures averaged $1,963 per billfish caught, while expenditures for non-residents averaged $2,132 per billfish caught. Ditton and Clark (1994) estimated the net economic benefits per trip at $549, yielding total annual net economic benefits of $18 million. Total resident and non-resident (U.S. citizens and foreign countries) angling expenditures were over $21 million and $4 million, respectively.

2.1.4.2 Commercial Fishery (Gross Revenues Foregone)

Critical values relative to the commercial fishery are the forgone gross revenues (and/or consumption) resulting from the ban on retention of billfish bycatch. Atlantic billfish caught by U.S. commercial fishing operations (mainly swordfish and tuna longline fisheries) in the Atlantic

Ocean (including the Gulf of Mexico and Caribbean Sea) can not be landed or sold. In the Pacific Ocean, however, billfish can be landed and sold by U.S.-flagged vessels and marketed in states other than their state of origin, provided that proper documentation accompanies the sale of the fish as described in 50 CFR 644.24. Using ex-vessel price information from the Hawaii longline fishery (Ito and Machado, 1997), the gross revenues forgone by U.S. commercial fishermen for discarding the incidental catch of billfish in the Atlantic Ocean may be estimated (Table 2.1.11). During 1989 to 1996, the ex-vessel gross revenue foregone for billfish discarded by longline fishers ranged from $237,989 to $433,207 for Atlantic blue marlin, with an eight-year cumulative (1989 to 1996) gross revenue of $2.5 million. Estimated gross revenue of Atlantic white marlin over this same time period totaled $1.6 million, with gross annual revenues ranging from $149,189 to $254,633 (using striped marlin ex-vessel prices as an approximation of white marlin prices). Gross revenues forgone from west Atlantic sailfish dead discards from pelagic longline gear between 1989 to 1996 ranged from $123,194 to $198,667, with a total gross revenue over eight years of $1,118,950. Over the eight-year period between 1989 and 1996, the cumulative estimate of gross revenues for dead discards of all billfish (blue marlin, white marlin and sailfish) is $5.3 million, or $664,648/year. Note in comparison that these figures are considerably less than the $180 million spent each year ($1.44 billion over an eight-year period) by tournament anglers alone, and the net economic benefits of $2 million per year ($16 million over eight years).

Figure 2.1.1. Bootstrapped median relative biomass for Atlantic blue marlin in the total Atlantic Ocean (SCRS, 1998).

Figure 2.1.2. Bootstrapped median relative biomass for Atlantic white marlin in the total Atlantic Ocean (SCRS, 1998).

Figure 2.1.3. Bootstrapped median relative biomass for Atlantic blue marlin in the north Atlantic Ocean (SCRS, 1998).

Figure 2.1.4. Bootstrapped median relative biomass for Atlantic white marlin in the north Atlantic Ocean (SCRS, 1998).

Figure 2.1.5. Bootstrapped annual relative biomass for west Atlantic sailfish (SCRS, 1998).

Figure 2.1.6. Reported catches of Atlantic Blue Marlin from the Atlantic Ocean (North and South Atlantic Ocean combined) for 1987 to 1996 (SCRS, 1997).

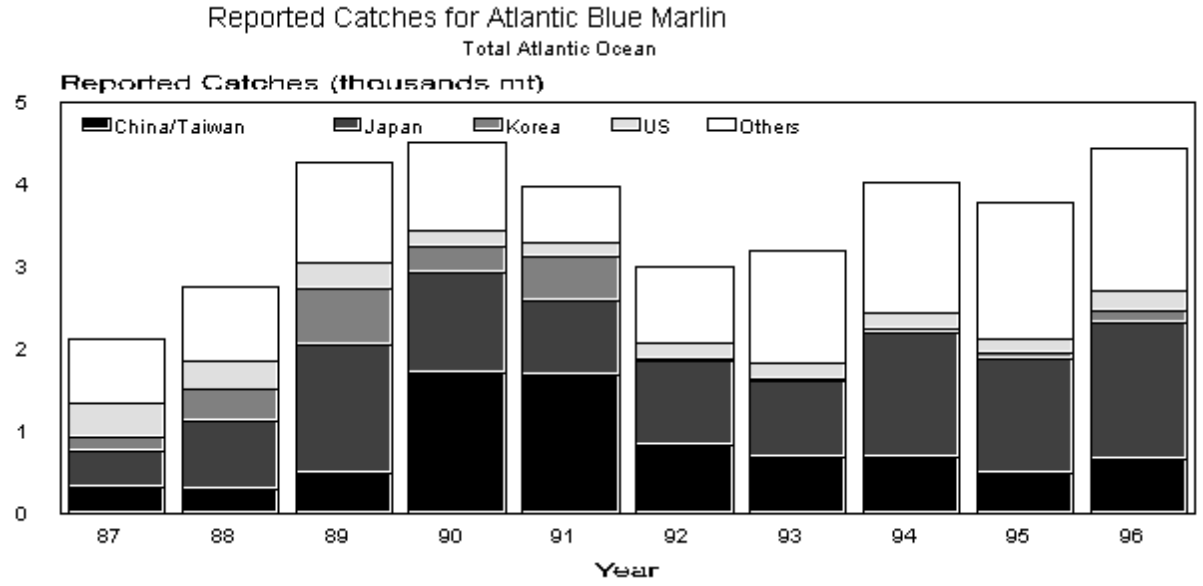

Figure 2.1.7 Reported catches of Atlantic White Marlin from the Atlantic Ocean (North and South Atlantic Ocean combined) for 1987 to 1996 (SCRS, 1997)

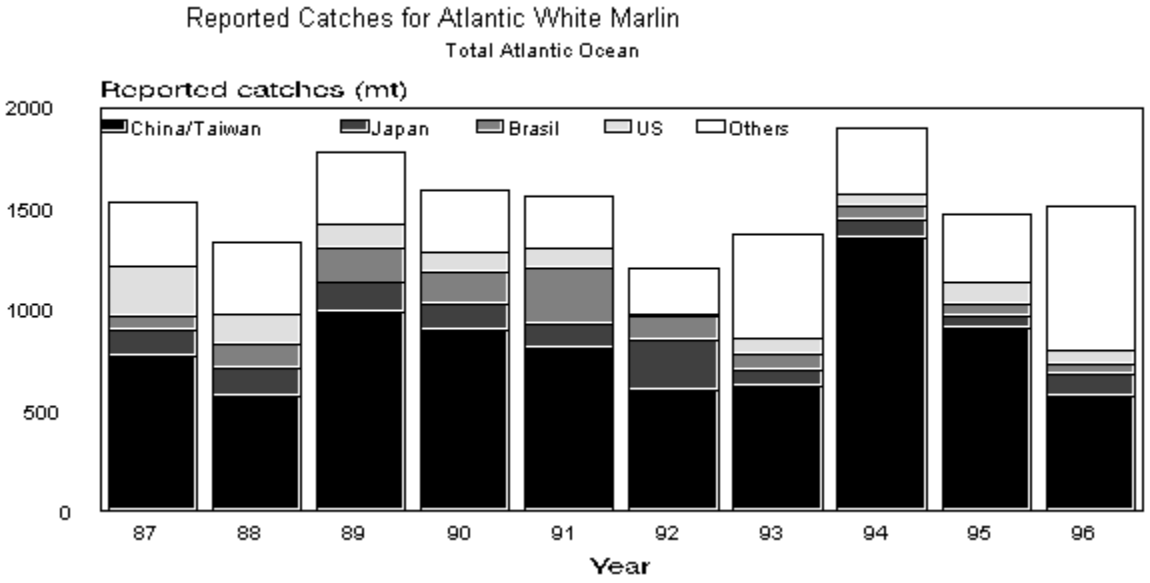

Figure 2.1.8. Reported catch (in mt) of west Atlantic sailfish and spearfish, by year and country, for the western Atlantic Ocean (SCRS, 1997).

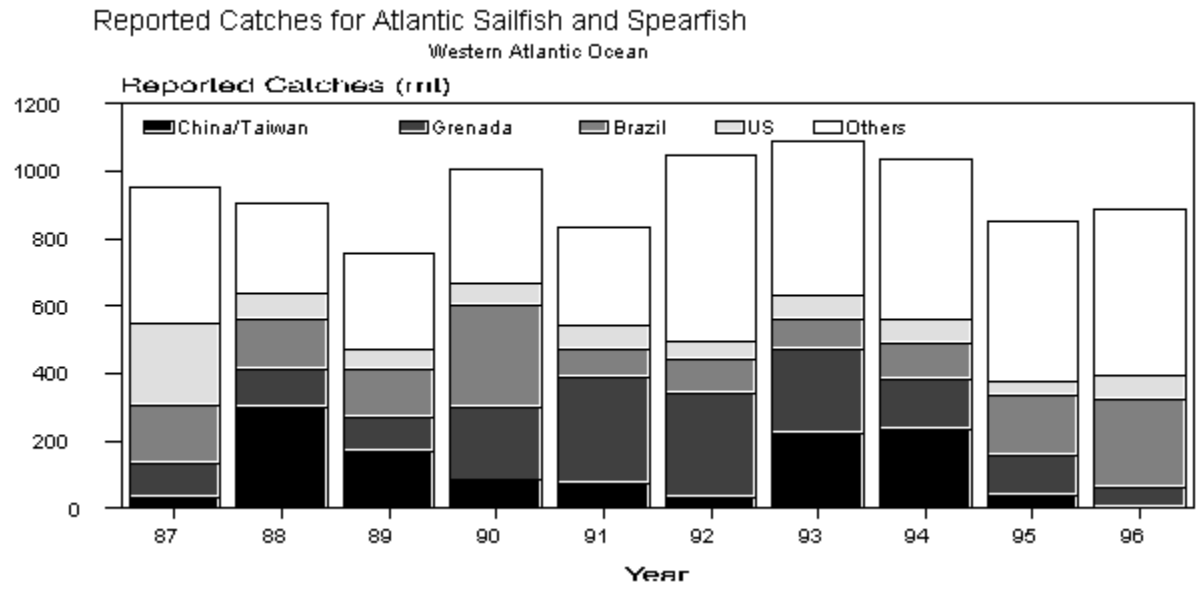

Figure 2.1.9. Reporting catch of blue marlin in the north, south and total Atlantic Ocean (data from SCRS, 1997)

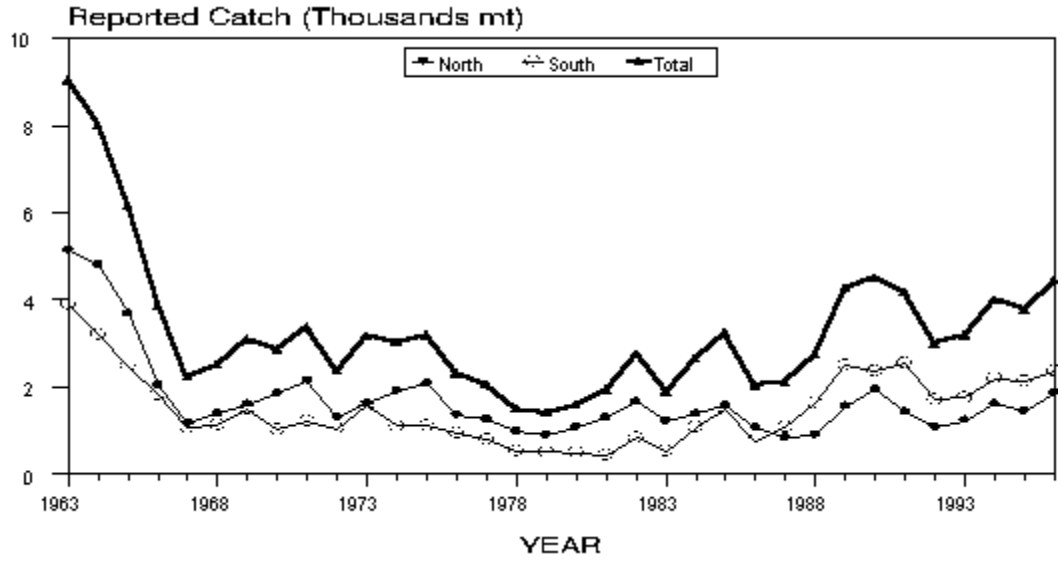

Figure 2.1.10. Reporting catch of white marlin in the north, south and total Atlantic Ocean (data from SCRS, 1997).

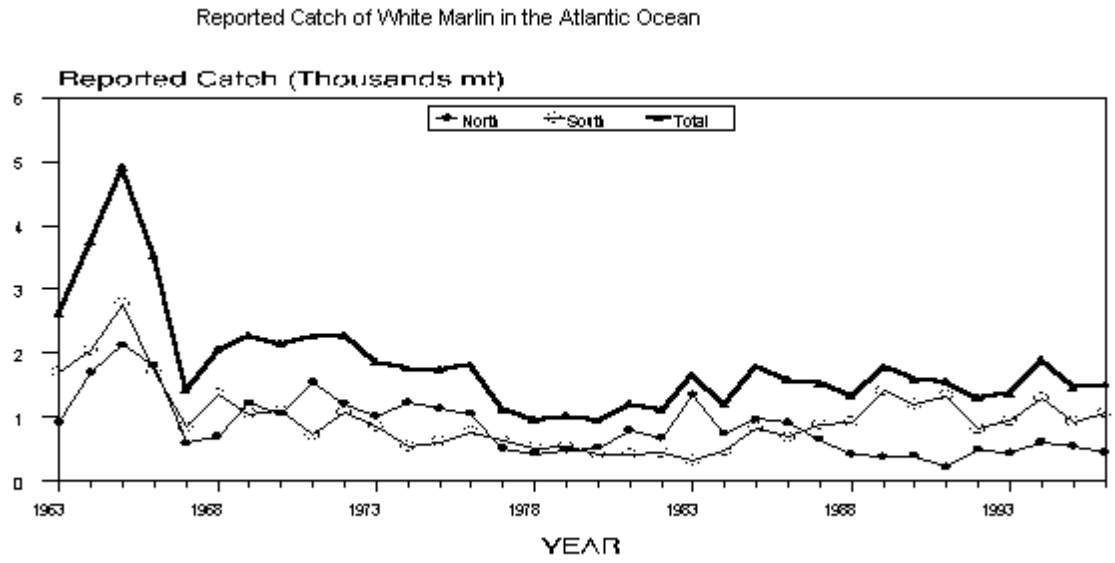

Figure 2.1.11. Reporting catch of sailfish and spearfish in the east, west and total Atlantic Ocean (data from SCRS, 1997).

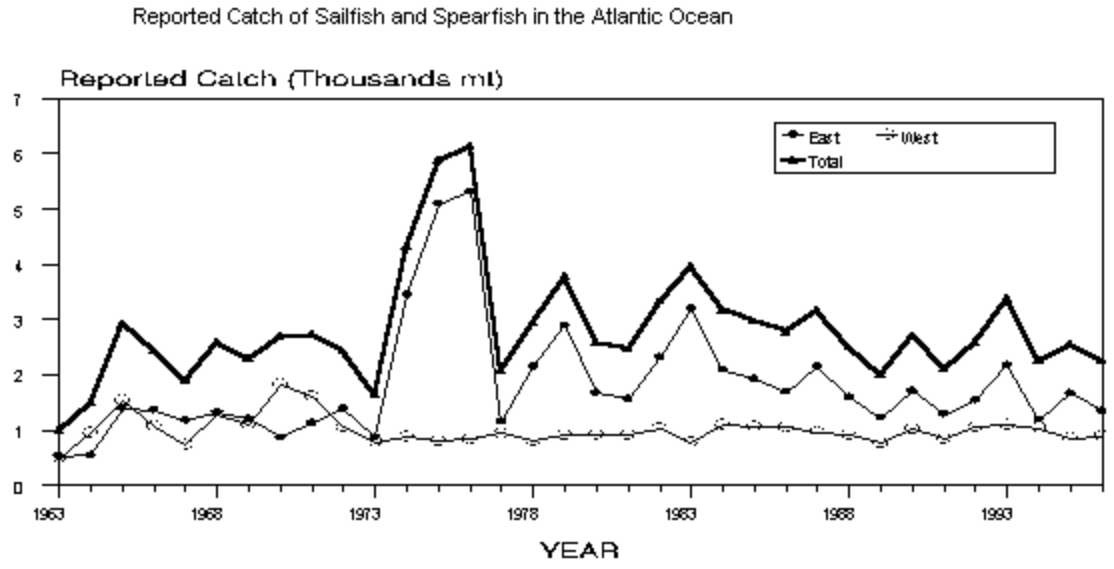

Figure 2.1.12. Summary of number of Atlantic billfish discarded by U.S. fishermen, by area and year, from longline gear, based on pelagic logbook data (Cramer and Scott 1998).

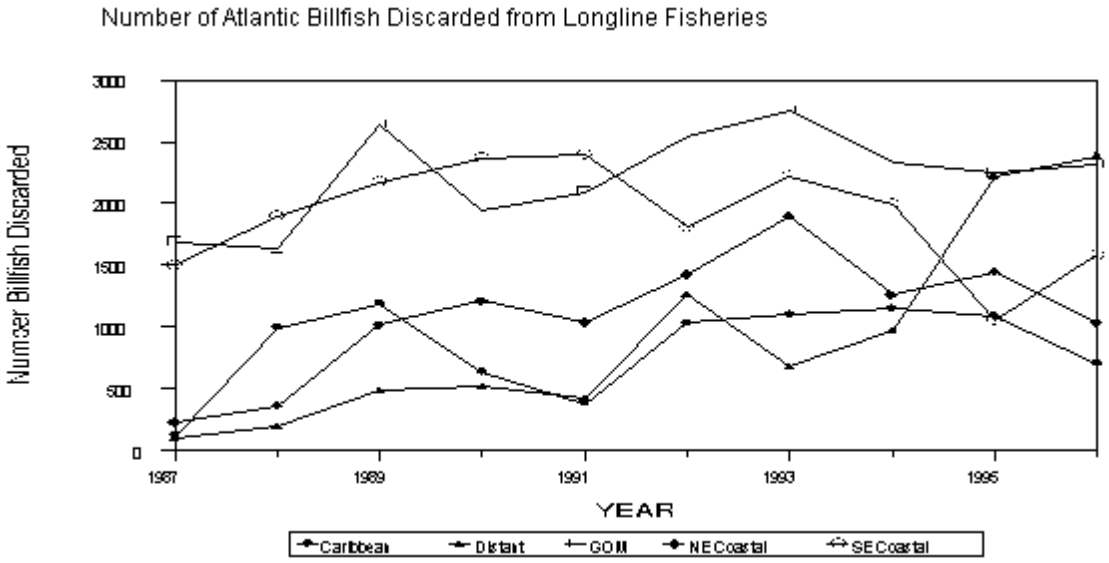

Figure 2.1.13. Recreational landings, and commercial landings (until 1990) and incidental catches from pelagic longline gear resulting in dead discards of Atlantic blue marlin in the United States (data from SCRS, 1996).

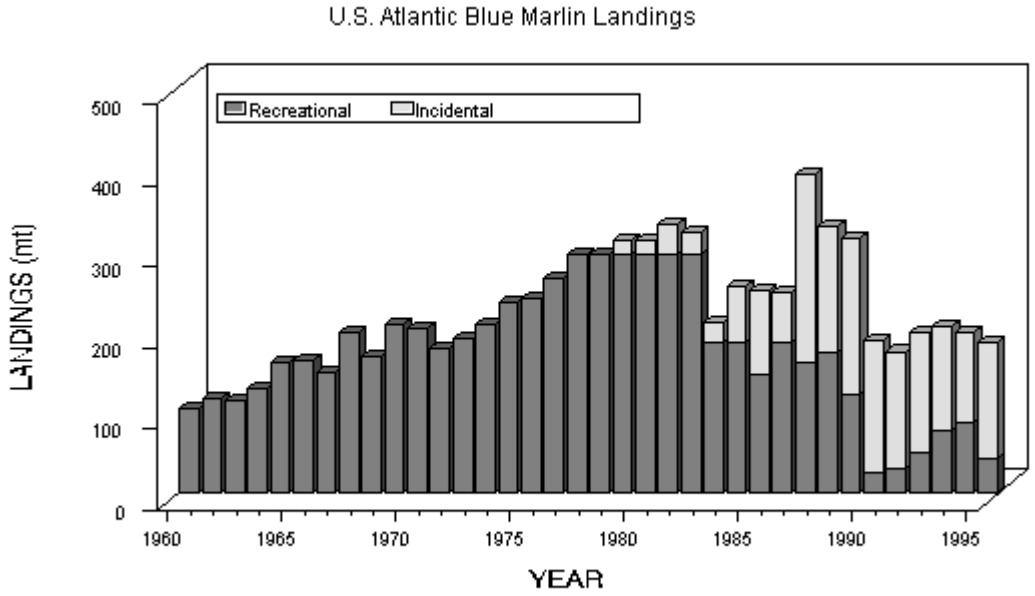

Figure 2.1.14. Recreational landings, and commercial landings (until 1990) and incidental catches from pelagic longline gear resulting in dead discards of Atlantic white marlin in the United States (data from SCRS, 1996).

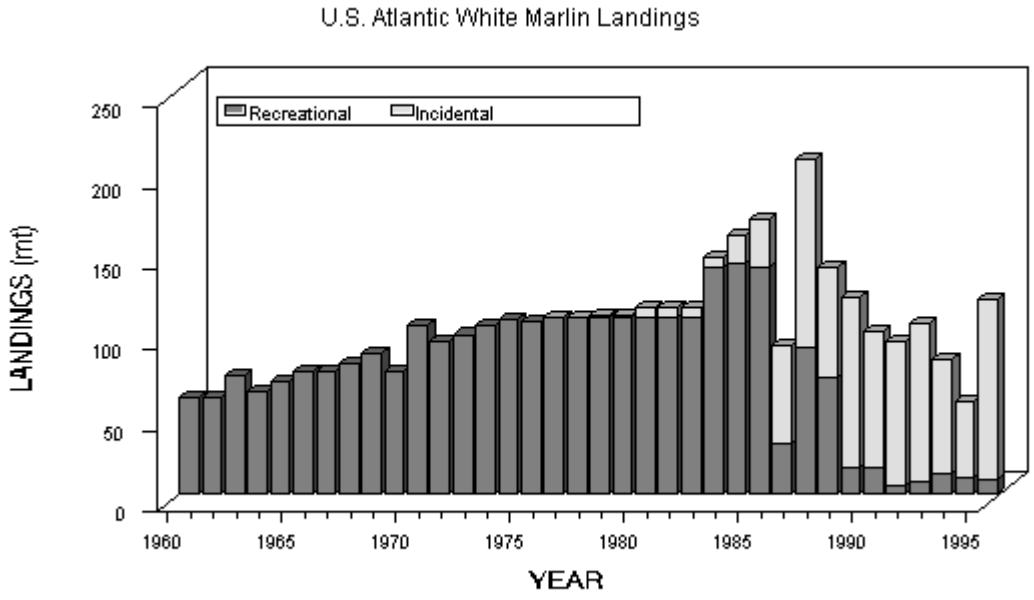

Figure 2.1.15. Composited relative indices of north Atlantic blue and white marlin from rod and reel gear (data from SCRS/96/19).

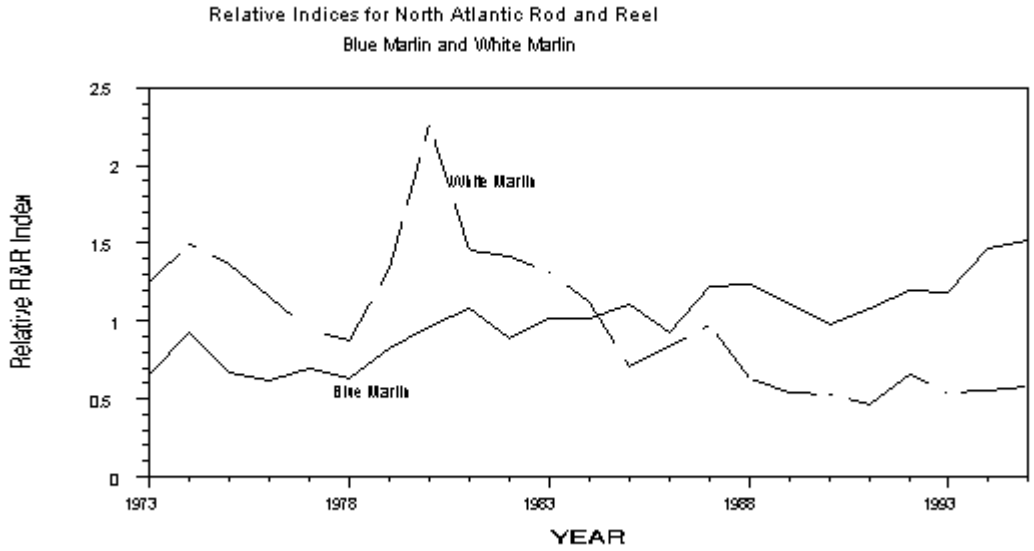

Table 2.1.1. Summary of ICCAT member countries with the highest reported catches (mt) of billfish, by species, for 1996.

COUNTRY	Atlantic Blue Marlin mt (%)	Atlantic White Marlin mt (%)	West Atlantic Sailfish mt (%)
Brazil	82 (1.9%)	41 (3.4%)	263 (29.7%)
Chinese Taipei	643 (15.2%)	566 (37.5%)	
Cote d'Ivoire	144 (3.4%)		
Dominican Republic			90 (10.2%)
Gabon		406 (26.9%)	
Ghana	422 (10%)		
Japan	1668 (39.3%)	109 (7.2%)	
Korea	144 (3.4%)	57 (3.8%)	
NEI-1		102 (6.8%)	
Trinidad & Tobago	150 (3.5%)		100 (11.3%)
U.S.	233 (5.5.%)	70 (4.6%)	72 (8.1%)
Venezuela	113 (2.7%)	96 (6.4%)	148 (16.7%)
All Other Countries	640 (15.1%)	58 (3.8%)	213 (24%)
Total (All Countries)	4,339	1,508	886

Table 2.1.2. Number of Atlantic billfish caught and percent released alive, by area, from the 1995 U.S. commercial longline fishery.

Location	Number Blue Marlin Caught	Percent Blue Marlin Released Alive	Number White Marlin Caught	Percent White Marlin Released Alive	Number Sailfish Caught	Percent Sailfish Released Alive	Number Spearfish Caught	Percent Spearfish Released Alive
Caribbean	538	84.5	183	77.8	52	73.2	22	100
Grand Banks	11	64	19	73.8	0	N/A	21	66.5
Gulf of Mexico	411	69.6	434	63.9	504	56	11	27
Northeast Coastal	160	79.6	808	71.6	17	70.4	2	50
Offshore South	869	69.2	588	61.1	129	41.9	270	62.3
Southeast Coastal	308	75.6	258	78.7	258	66	24	79.2
Total	2297	74.4	2290	68.8	960	58	350	64.9

Table 2.1.3. Regional billfish catch and harvest characteristics for the 1989 recreational billfish tournament anglers (Fisher and Ditton, 1992).

Region	Number of Respondents	Total Billfish Boated	Total Billfish Retained	Percent Released	Catch per Angler	Retention per Angler
Caribbean	100	184	48	74	1.84	0.48
Gulf of Mexico	326	270	50	81	0.83	0.15
Mid-Atlantic	318	687	34	95	2.16	0.11
South Atlantic	343	583	51	91	1.7	0.15
Total	1129	1821	196	89	1.61	0.17

Table 2.1.4. U.S. commercial dead discards (mt) and minimal recreational landing estimates (mt) of Atlantic Blue Marlin and Atlantic White Marlin for 1994, 1995 and 1996 (National Report of the United States: 1998).

	Atlantic Blue Marlin			Atlantic White Marlin			Atlantic Sailfish		
	1995	1996	1997	1995	1996	1997	1995	1996	1997
Northwest Atlantic									
Longline Discards	23.7	37.3	18.7	48.3	25.3	11.2	7.5	19.2	9.2
Rod & Reel	23	18	25	8	2.7	0.9	9	0.2	0
Gulf of Mexico									
Longline Discards	30.2	24.7	51	20.8	11.6	15.4	15.6	42.1	13.3
Rod & Reel	14	8.3	11.5	1	0.6	0.9	1	0.8	0.4
Caribbean									
Longline Discards	32.8	124.7	24.6	5.3	26.6	6.6	0.9	8.2	3.3
Rod & Reel	6	9.6	8.6	0	0	0	0	0.2	0.2
Other	0.5	0	0	0	0	0	0	0	0
Unknown									
Longline Discards	56.6	8.6	2.3	25.3	3.9	0.5	4.7	1.9	0
Southwest Atlantic									
Longline Discards	0	1.24	41.5	0	0.2	37.1	0	0.2	31.9
All Gear Totals	186.8	231.4	183.2	108.7	70.9	72.6	38.7	72.8	58.3
Rod & Reel Totals	43	34.9	45.1	9	3.3	1.8	10	1.2	0.6

Table 2.1.5. Catch, by number, of blue marlin, white marlin, sailfish and spearfish from 1995 pelagic logbook reports (Cramer, 1996).

Location	Number Blue Marlin Caught	Percent of Total Catch	Number White Marlin Caught	Percent of Total Catch	Number Sail-fish Caught	Percent of Total Catch	Number Spear-fish Caught	Percent of Total Catch
Caribbean	538	3.33	183	1.13	52	0.32	22	0.14
Grand Banks	11	0.01	19	0.01	0	0	21	0.02
Gulf of Mexico	411	0.9	434	0.95	504	1.10	11	0.02
Northeast Coastal	160	0.09	808	0.45	17	0.01	2	0.001
Offshore South	869	2.78	588	1.88	129	0.41	270	0.86
Southeast Coastal	308	0.57	258	0.48	258	0.47	24	0.04
TOTAL	2297	0.49	2290	0.49	960	0.2	350	0.07

Table 2.1.6. U.S. Catch (reported recreational landings and pelagic longline dead discards), as percentage of international catch, by weight, in the Atlantic Ocean (SCRS, 1997).

	1990	1991	1992	1993	1994	1995	1996
North Atlantic Blue Marlin	9.7	12.3	18.2	16.8	12.4	12.8	12.4
Total Atlantic Blue Marlin	4.2	4.2	6.6	6.5	5.0	4.9	5.2
North Atlantic White Marlin	25.3	43.8	19.8	18.2	9.1	20.3	15.8
Total Atlantic White Marlin	6.3	6.1	7.4	5.8	2.9	7.4	4.6
West Atlantic Sailfish/Spearfish	6.6	8.3	4.9	6.6	7.1	4.6	8.1

Table 2.1.7. Regional billfish angler and trip characteristics in the western U.S. Atlantic Ocean (Fisher and Ditton, 1992).

Region	Sample Size	Trips per year per angler	Successful trips per year per angler	Percentage Trips Successful	Billfish landed per year per angler
Caribbean	100	17.3	6.96	40.2	2.87
Gulf of Mexico	326	8.7	2.44	28.0	0.44
Mid-Atlantic	318	13.0	5.96	45.8	0.35
South Atlantic	343	16.5	6.72	40.7	0.66
Total	1,129	13.1	5.21	39.8	0.68

Table 2.1.8. Summary of the 1995 Recreational Billfish Survey of 120 billfish tournaments showing the number of fish caught, released and retained (NMFS, 1997).

Geographic Area of Tournament	Hours of Effort	Number Billfish Caught [1]	Number BUM Caught	Number WHM Caught	Number Sailfish Caught	Number Billfish Released (Discard Ratio)[2]
East Coast (excluding Florida)	24,055	797	151	570	74	733 (92%)
Florida East Coast & Florida Keys	18,566	2,110	5	1	2,103	2,092 (99.1%)
Bahamas	15,490	486	417	56	13	430 (88.5)
Caribbean (Puerto Rico and Virgin Islands)	9,246	255	252	1	2	214 (83.9%)
Gulf of Mexico	20,862	660	388	178	94	507 (76.8%)[3]
Total	88,319	4,308	1,213	806	2,286	3,976 (92.3%)

[1]Catch includes fish that are hooked and released, and billfish that are kept, but does not include the number of billfish hooked and lost before being boated or released.

[2]Over 90% of billfish that are releases are tagged. The revised (1998) tournament reporting forms include data on the number released alive, with or without tags, and the number released dead.

[3]A total of 595 additional billfish were lost before being brought to the boat, giving a total 87.5 percent bycatch (discard ratio + fish hooked and lost) for the Gulf of Mexico recreational billfish fishery. An estimate of number of fish lost was not available for other geographic areas.

Table 2.1.9. Personal and participation characteristics of billfish anglers in the eastern United States and Puerto Rico (adapted from Ditton, 1996).

Personal and Participation Characteristics	U.S. Atlantic	Puerto Rico (residents)	Puerto Rico (non-residents)
Gender (percent male)	98	97	93
Age (mean years)	46	40	49
Median Household Income	$110,000-$119,000	$70,000-$79,000	$90,000-$99,000
Education (mean years)	16	16	16
Saltwater Fishing Experience (mean years)	26	19	24
Billfish Fishing Experience (mean years)	14	14	16
Annual Frequency (mean days)	39	43	38
Billfish Release Rates (percent)	89	72	87

Table 2.1.10. Mean expenditures per trip by billfish tournament anglers (Fisher and Ditton, 1992).

Expenditure Item	Mean Spent per Billfish Angler	Percent of Anglers Who Purchased This Item	Mean Expense to Angler that Purchased This Item
Food, drinks, ice	$152.61	80.2	$190.29
Boat operation	$462.56	72.8	$635.38
Bait and tackle	$95.65	67.1	$142.55
Automobile transportation	$38.28	58.7	$65.23
Lodging	$163.88	32.9	$498.12
Non-automobile transportation	$170.64	25.2	$677.14
Captain/charter fees	$203.75	23.8	$856.09
Slip rental, repairs, satellite data, etc	$90.28	14.1	$640.28
Boat rental	$144.23	10.5	$1,373.62
Entrance fees	$50.57	10.1	$500.69
Boat launch/hoist fees	$28.16	8.9	$316.14
Total (N=1,129)	$1,600.62		

Table 2.1.11. Longline dead discards of Atlantic blue and white marlin, and west Atlatnic sailfish for 1989 to 1996, and estimates of gross revenue forgone based on prices from the Hawaii longline fishery.

Species	Year	Longline Discards in mt	Longline Discards in lbs	Ex-vessel prices	Estimated Gross Revenue Foregone
Blue Marlin					
	1989	191	421,082	$0.84	$353,709.00
	1990	159	350,534	$0.92	$322,492.00
	1991	142	313,056	$0.78	$244,184.00
	1992	147	324,079	$1.16	$375,932.00
	1993	127	279,987	$0.85	$237,989.00
	1994	112.9	248,902	$1.28	$318,594.00
	1995	143.8	317,024	$0.87	$275,811.00
	1996	196.5	433,207	$1.00	$433,207.00
	Total				$2,561,918.00
White Marlin[3]					
	1989	105	231,485	$1.10	$254,633.00
	1990	82	180,779	$1.38	$249,474.00
	1991	89.3	196,873	$0.99	$194,903.00
	1992	88	194,007	$1.27	$246,388.00
	1993	65.7	144,844	$1.03	$149,189.00
	1994	42.4	93,476	$1.70	$158,909.00
	1995	99.8	220,021	$0.90	$198,019.00
	1996	67.6	149,032	$1.24	$184,800.00
	Total				$1,636,315.00
Sailfish					
	1989	56.9	125,443	$1.10	$137,987.00

[3]Price information for Atlantic white marlin is based on ex-vessel price of striped marlin from Hawaii's longline fishery.

Species	Year	Longline Discards in mt	Longline Discards in lbs	Ex-vessel prices	Estimated Gross Revenue Foregone
	1990	65.3	143,962	$1.38	$198,667.00
	1991	67.3	148,371	$0.99	$146,887.00
	1992	44	97,003	$1.27	$123,194.00
	1993	66.1	145,725	$1.03	$150,097.00
	1994	29.2	64,375	$1.70	$109,437.00
	1995	28.7	63,273	$0.90	$56,946.00
	1996	71.6	157,851	$1.24	$195,735.00
	Total				$1,118,950.00

2.2 Gear Types

2.2.1 Recreational Sportfishing Gear

In the United States, only recreational anglers can land Atlantic billfish. Sport fishing for Atlantic billfish on private recreational and charterboats is done with rod and reel, often with multiple rigs being trolled simultaneously. The sportfishing gear used is generally more expensive than used for other recreational marine species. Atlantic blue and white marlin are generally caught using multiple hook artificial lures that are trolled at high speeds, relative to other pelagic fisheries. This method of fishing effectively limits catches to targeted billfish species. Some billfish anglers, particularly those fishing for west Atlantic sailfish, utilize live baits on multiple hooks. Atlantic billfish caught with high-speed lures are generally hooked around the mouth/bill area, which enhances the release survival rate. Live baits are generally pulled at a slower speed than artificial lures, and can be swallowed by billfish, resulting in a gut-hooked fish. Post-release survival rates was identified as a critical data need for Atlantic billfish management (Section 1.4). Atlantic blue marlin and white marlin seasons generally begin in May, although tournaments in warmer-water areas (e.g., Bahamas) will start in March. Marlins move up along the coast of the United States as waters warm during the summer, with relatively more white marlin traveling farther north to be caught off mid-Atlantic and southern New England during July to September. The Atlantic marlin season generally ends by October for the continental United States, but fish are still caught in the warm Caribbean waters off Puerto Rico and the U.S. Virgin Islands. West Atlantic sailfish are also caught throughout the summer in the Gulf of Mexico and along the east coast of the United States; however, peak numbers of sailfish are caught off South Florida and Florida Keys in the late fall and early winter.

The 1988 Atlantic Billfish FMP noted that boats used in the U.S. sport fishery for billfishes range from 16 feet to more than 65 feet in length, powered with outboard engines to large diesels. Lucy *et al*. (1990), describing the fleet characteristics in Virginia's recreational marlin-tuna fishery, found that boats averaged 28 feet in length, with charterboats averaging 37 feet, and private boats averaging 26 feet in length. Fishing for blue marlin and white marlin generally requires a larger vessel with inboard engines because of the distance needed to travel to reach the fishing grounds. Trips in excess of 100 miles from the shore may be required to reach primary fishing areas. Sailfish tend to be found in shallower waters, closer to shore, which allows the use of smaller boats with outboard engines. In some geographical areas, where deep waters are closer to shore, vessels of all sizes targeting marlin and sailfish can be found. This is particularly evident off the southeast coast of Florida, northern Gulf of Mexico and the Caribbean (Puerto Rico and U.S. Virgin Islands). The development of more reliable engines, electronic devices (e.g., GPS, cellular phones, and satellite-based communications), and new vessel designs has made offshore fishing grounds accessible to more anglers in a greater variety of vessel sizes.

2.2.2 Commercial Fishing Gear

This section describes the commercial gears used to catch Atlantic HMS where Atlantic billfish may occur as bycatch (Section 3.5).

2.2.2.1 Pelagic Longlines

The U.S. pelagic longline fishery for Atlantic HMS primarily targets swordfish, yellowfin tuna, or bigeye tuna in various areas and seasons. Secondary target species include dolphin, albacore tuna, pelagic sharks including mako, thresher, blue sharks and porbeagle, as well as several species of large coastal sharks. Although this gear can be modified (i.e., depth of set, hook type, etc.) to target either swordfish or tunas, like other hook and line fisheries, it is a multi-species fishery. These fisheries are opportunistic, switching gear style and making subtle changes to target the best available economic opportunity of each individual trip. Longline gear sometimes attracts and hooks non-target finfish with no commercial value, as well as species which cannot be retained by commercial fishermen, such as billfish. Pelagic longlines may also interact with protected species such as marine mammals, sea turtles and sea birds, and have thus been classified as a Category I fishery with respect to the Marine Mammal Protection Act. Any species (or undersized animal of permitted species) that cannot be landed due to fishery regulations is required to be released, whether dead or alive.

Pelagic longline gear is composed of several parts. The primary fishing line, or mainline of the longline system, can vary from five to 40 miles in length, with approximately 20 to 30 hooks per mile. The depth of the mainline is determined by ocean currents and the length of the floatline, which connects the mainline to several buoys and periodic markers with radar reflectors and radio beacons. Each individual hook is connected by a leader to the mainline. Lightsticks, which contain chemicals that emit a glowing light are often used. When attached to the hook and suspended at a certain depth, they attract bait fish which may, in turn, attract pelagic predators. When targeting swordfish, the lines generally are deployed at sunset and hauled in at sunrise to take advantage of the nocturnal near-surface feeding habits of the large pelagic species (Berkeley *et al*., 1981). In general, longlines targeting tunas are set in the morning, deeper in the water column, and hauled in the evening. Except for vessels of the distant water fleet which undertake extended trips, fishing vessels preferentially target swordfish during periods when the moon is full to take advantage of increased densities of pelagic species near the surface. Those sets targeting dolphin are set in the daytime near the surface, with shorter longlines and shorter soak time.

Secondary hook and line gear is permitted onboard pelagic longline vessels. Longliners use harpoons for safer handling of larger fish, and for the occasional harvest of free swimming fish that approach the vessel during haul-back. Using a technique known as “green sticking,” fishermen may use a long pole to extend several longline leaders and hooks behind the vessel. Typically, this line is trolled while hauling the primary gear or while the vessel is moving on the fishing grounds. “Jigging machines” are a type of bandit gear used for trolling drift handlining

HMS. Many pelagic longliners troll regular rod and reel gear while drifting to determine what species are available in the area they are passing through.

Reported effort, in terms of number of vessels fishing, has fluctuated in recent years but has not shown obvious trends in the distant water, southeast coastal, and northeast coastal areas. However, there appears to be a trend towards decreasing numbers of vessels fishing in the Caribbean and the Gulf of Mexico. In all areas, the reported number of hooks per set has increased. Although swordfish appear to have remained the primary target species in the Caribbean, distant water, and southeast coastal fishery areas, the proportion of swordfish in the reported landed catch has decreased in both the distant water and southeast coastal areas. In the case of the distant water fishery, an increasing proportion of the reported landings consist of either yellowfin, albacore, bigeye and/or skipjack tunas. Coastal shark and reported dolphin landings have increased in the southeast coastal area. The largest decreases in targeting and landing of swordfish were in the northeast coastal area (Cramer and Adams, 1998). The Gulf of Mexico, which has historically been primarily a yellowfin tuna fishery, has had an increase in reported targeting and landing of swordfish in recent years (Cramer and Scott, 1998).

The pelagic longline fishery sector is comprised of five relatively distinct segments with different fishing practices and strategies, including the Gulf of Mexico yellowfin tuna fishery, the south Atlantic-Florida east coast to Cape Hatteras Swordfish fishery, the mid-Atlantic and New England swordfish and bigeye tuna fishery, the U.S. distant water swordfish fishery, and the Caribbean Islands tuna and swordfish fishery. Each vessel type has different range capabilities due to fuel capacity, hold capacity, size, and construction. In addition to geographical area, segments differ by percentage of various target and non-target species, gear characteristics, bait, and deployment techniques. Some vessels fish in more than one fishery segment during the course of the year.

The Gulf of Mexico Yellowfin Tuna Fishery

These vessels primarily target yellowfin tuna year-round; however, each port has one to three vessels that direct on swordfish either seasonally or year-round. Longline fishing vessels that target yellowfin tuna in the Gulf of Mexico also catch and sell dolphin, swordfish, and other tunas and sharks. During yellowfin tuna fishing, few swordfish are captured incidentally. Many of these vessels participate in other Gulf of Mexico fisheries (targeting shrimp, shark, and snapper/grouper) during allowed seasons. Major home ports for this fishery include Panama City, Florida; Destin, Florida; Dulac, Louisiana; and Venice, Louisiana.

The South Atlantic ~ Florida East Coast to Cape Hatteras Swordfish Fishery

These pelagic longline vessels primarily target swordfish year-round. Yellowfin tuna and dolphin are other important marketable components of the catch. Smaller vessels fish shorter trips from the Florida Straits north to the bend in the Gulf Stream off Charleston, South Carolina (Charleston Bump). Mid-sized and larger vessels migrate seasonally on longer trips from the Yucatan Peninsula throughout the West Indies and Caribbean Sea and some trips range as far north as the mid-Atlantic coast of the United States to target bigeye tuna and swordfish during the late summer and fall. Fishing trips in this fishery average nine sets over 12 days. Major home ports (including seasonal ports) for this fishery include Georgetown, SC; Cherry Point, SC; Charleston, SC; Fort Pierce, FL; Pompano Beach, FL; Dania, FL; and Key West, FL. This sector of the fishery consists of small to mid-size vessels which typically sell fresh swordfish to local high-quality markets.

The Mid-Atlantic and New England Swordfish and Bigeye Tuna Fishery

This fishery has evolved during recent years to become an almost year-round fishery based on directed tuna trips, with substantial numbers of swordfish trips as well. Some vessels participate in the directed bigeye/yellowfin tuna fishery during the summer and fall months and then switch to bottom longline fisheries and/or shark fishing during the winter when the shark season is open. Fishing trips in this fishery sector average 12 sets over 18 days. During the season, vessels primarily offload in the major ports of Fairhaven, MA; Montauk, NY; Barnegat Light, NJ; Ocean City, MD; and Wanchese, NC. Some of these vessels follow the swordfish along the mid-Atlantic coast, then fish off the coast of the southeast United States during the winter months.

The U.S. Atlantic Distant Water Swordfish Fishery

This fleet's fishing grounds range virtually the entire span of the western North Atlantic to as far east as the Azores and the mid-Atlantic Ridge. About ten larger vessels operate out of mid-Atlantic and New England ports during the summer and fall months, and move to Caribbean ports during the winter and spring months. Many of the current distant water operations were among the early participants in the U.S. directed Atlantic commercial swordfish fishery. These larger vessels, with greater ranges and capacities than the coastal fishing vessels, enabled the United States to become a significant player in the north Atlantic fishery. They also fish for swordfish in the south Atlantic. The New England longline vessels traditionally have been larger than their Florida counterparts because of the distances required to travel to the fishing grounds. The larger sized vessels allow more time at sea. A typical New England longline vessel generally ranges from 60 to 80 feet in length, and fishes off New England in the summer and fall. As winter approaches, these vessels work their way southward. Fishing trips in this fishery tend to be longer than in other fisheries, averaging 30 days and 16 sets. Principal ports for this fishery range from San Juan, Puerto Rico through Portland, ME, and include Fairhaven, MA, and Barnegat Light, NJ. There have been approximately ten to fifteen distant water vessels in recent

years, reduced from a peak of 60 to 70 vessels in the late 1980s and early 1990s. Some large vessels have moved to other oceans to fish for HMS or have re-flagged.

The Caribbean Tuna and Swordfish Fishery

This fleet is similar to the southeast coastal fishing fleet in that both are comprised primarily of smaller vessels that make short trips relatively near-shore, producing very high quality fresh product. Both fleets also encounter relatively high numbers of undersized swordfish at certain times of the year. Longline vessels targeting HMS in the Caribbean set fewer hooks per set, on average, fishing deeper in the water column than the distant water fleet off New England, the northeast coastal fleet, and the Gulf of Mexico yellowfin tuna fleet. This fishery is typical of most pelagic fisheries, being truly a multi-species fishery, with swordfish as a substantial portion of the total catch. Yellowfin tuna, dolphin and, to a lesser extent, bigeye tuna, are other important components of the landed catch. Principal ports are St. Croix, U.S. Virgin Island; and San Juan, Puerto Rico. Many of these high quality fresh fish are sold to local markets to support the tourist trade in the Caribbean.

2.2.2.2 Atlantic Pelagic Driftnets

Pelagic driftnets are set anywhere from mid-water to the surface and drift with tide and wind conditions. The vessel stays with one end of the net to ensure that the net remains stretched. Several driftnets may be set end to end in a string. Pelagic driftnets are best described as "entanglement" nets, rather than gillnets, since the objective is to entangle, rather than gill, the target fish. Driftnet fishing for large pelagics is most common at night, with soak times averaging 12 hours. Fishermen prefer fishing when the moon is dark to prevent detection of the net by target species. Schools of fish are not specifically targeted with this gear; however, nets are set near oceanographic thermal fronts where large pelagic fish congregate. During swordfish seasons in the past, driftnet gear was typically 20 to 22 inch mesh size, 60 to 70 meshes deep, set 18 to 30 feet below the surface, and with a floatline length of 1.5 miles. The Magnuson-Stevens Act limits the length of the net to 2.5 km. In 1999, NMFS prohibited the use of driftnet gear in the Atlantic swordfish fishery in an effort to reduce bycatch of many species including, marine mammals. No driftnet sets to date have been made in sole pursuit of large coastal sharks although NMFS has received inquiries as to the possibility of this fishery. NMFS has prohibited the use of swordfish drift gill nets and is concerned about the possibility that expansion of a New England pelagic driftnet shark fishery might further exacerbate bycatch problems with this gear.

2.3 Current Permitting, Reporting, Data Collection Requirements and Fisheries Monitoring

Monitoring programs form the foundation of effective management in both commercial and recreational fisheries. NMFS must ensure that this information is collected and processed efficiently; avoids duplication or redundancy; is compatible with other data sources; is secure; minimizes burdens on those reporting; is complete and accurate; is statistically valid and internally consistent; is relevant and responsive to users' needs; and is available on a timely basis. Data collection efforts must meet requirements for a comprehensive monitoring program for all HMS and Atlantic billfish species.

2.3.1 Monitoring and Reporting Recreational Fisheries

There is currently no individual or vessel permit requirement for U.S. recreational private or charterboats that target Atlantic billfish, except for those required by States. However, billfish anglers that also catch Atlantic tuna (bigeye, bluefin, skipjack, yellowfin or albacore) in the pursuit of a billfish are required to have a tuna permit if they wish to retain these fish. Commercial vessels can not retain billfish within the U.S. EEZ; however, commercial swordfish, shark and tuna fishing vessels are required to have the appropriate permits. (Section 2.3.4)

Recreational landings of billfish species are estimated using the NMFS Recreational Billfish Survey (RBS) which provides the number of billfish caught during tournaments held along the southeastern U.S. coast (south of 35° N), in the Gulf of Mexico, and U.S. Caribbean Sea regions (i.e., U.S. Virgin Islands and Puerto Rico). Throughout the billfishing tournament season, RBS samplers conduct interviews with the anglers at tournaments to collect data on the number of billfish hooked, boated, tagged and released during tournament and non-tournament fishing trips and to collect data on length, weight, and sex of individual billfish landed. Each year, the RBS estimates the number of hours of fishing efforts from selected tournaments, based on historical participation until the tournament registration requirement was invoked, operating in the northern Gulf of Mexico (Padre Island, Texas to St. Petersburg, Florida), the Caribbean Sea (Bahamas, Puerto Rico, U.S. Virgin Islands). These data are also used to estimate relative abundance of billfish by calculating the number of fish caught per 100 hours of fishing effort (CPUE) and number hooked per 100 hours of fishing (HPUE). The CPUE and HPUE are used to compare inter-annual variations. Information on tournament landings are also provided on a volunteer-basis from several organizations and state agencies (e.g., South Carolina, Massachusetts). The RBS summarizes Atlantic billfish recreational angler activity for the U.S. east coast (Cape Cod, MA to Savannah, GA), Florida east coast and Florida Keys, Bahamas, Caribbean (Puerto Rico and U.S. Virgin Islands), and the Gulf of Mexico.

To facilitate the RBS program, all billfish tournaments conducted from a port in an Atlantic, Gulf of Mexico, or Caribbean state must register the tournament with the Science Director at least 4 weeks prior to commencement, noting the time and location where the event will be held.

A "tournament" is defined in the final rule as "any fishing competition involving Atlantic HMS (including Atlantic billfish) in which participants must register or otherwise enter or in which a prize or award is offered for catching such fish." The registration requirement was implemented in a 180 day interim rule measure on March 24, 1998, (63 FR 14030), and extended for an additional 180 days on September 29, 1998 (3 FR 51859). The Atlantic billfish FMP amendment includes the tournament reporting as a final action selected under Section 3.8 (Monitoring, Permitting and Reporting). The majority of Atlantic billfish, particularly Atlantic blue and white marlin apparently are landed during billfish tournaments, based on interviews at tournaments and public testimony. Therefore, without a clear understanding of the total universe of tournaments within the United States, accurate measurements of total mortality can not be achieved. The tournament notification measure is a vital component that will be used to identify the U.S. billfish tournament universe that can then be used to develop a sampling frame to allow for better monitoring, data collection, and reporting of billfish tournaments. This action also facilitates compliance with the 1997 ICCAT recommendation to improve monitoring of billfish landings (Appendix B).

The 4-week tournament notification requirement implemented by the interim rule, and subsequently extended, has resulted in an increase in the number of billfish tournaments reporting to the NMFS Southeast Science and Research Director. The public was informed of the interim notification requirement, along with the increases in Atlantic blue and white marlin minimum sizes with the help of Billfish AP members, through a flyer summarizing the interim rule that was circulated through the HMS fax network, through mailings to known tournaments, state agencies, recreational fishing organizations, and through notices in major recreational fishing magazines.

If selected by the Science and Research Director, a fishing record must be completed and received by NMFS within 7 days (past regulations allowed 10 days) of completion of the tournament (see Appendix D, Form 2). The following information has been previously required (50 CFR 644.10(a)), and will continue with this FMP amendment (50 CFR 635.5(e)):

1. tournament name;
2. recorder's name and telephone number;
3. date for which the information is recorded;
4. hours fished (time from first line in the water to last line out of the water);
5. name of each vessel fishing that day;
6. for each vessel listed, the species of each billfish boated or released (dead, alive, tagged);
7. the weight and length of each billfish brought ashore;
8. the name, address and signature of the tournament director; and
9. the date signed.

However, this amendment is not intended to limit the specific data collected to that listed above, should there be alternative or additional data available that could enhance monitoring the health of the recreational fishery and status of billfish stocks. In addition, the following information is desired, but not mandatory:

1. prevailing weather conditions on the day reported; and
2. whether a tag was attached before the billfish was released.

NMFS received several responses during the public comment period for the proposed rule in regard to reported Atlantic billfish tournament information and the form format (Appendix D). A joint workshop with tournament directors/operators, fishing clubs, and constituent groups (e.g., TBF and CCA), together with NMFS may be useful to simplify and clarify the tournament reporting process.

2.3.2 Recreational Fishing Surveys

By definition, recreational landings of HMS are those that are not marketed through commercial channels, hence it is not possible to monitor anglers' catches through ex-vessel transactions as in the commercial fishery. Instead, NMFS has conducted statistical surveys of portions of recreational fisheries for well over a decade. The two primary survey vehicles of the recreational sector conducted by NMFS, other than the RBS and tournament sampling programs summarized above, are the Marine Recreational Fishing Statistics Survey (MRFSS) and the Large Pelagic Survey.

The MRFSS is a survey designed to provide regional and state-wide estimates of recreational catch for the entire spectrum of marine fish species in the Atlantic. It was not specifically designed to account for the "rare event" recreational fisheries like Atlantic billfish, although information on these species is obtained by the survey. The MRFSS does not cover the state of Texas nor does it cover the charter/headboat fisheries. Therefore, supplemental data are provided by an independent survey in the State of Texas and by the NMFS Headboat Survey in the southeast United States. Because the recreational fisheries for Atlantic blue marlin and white marlin, and west Atlantic sailfish are not often observed within the MRFSS statistical framework, surveys of billfish tournaments are independently conducted by the SEFSC to obtain catch estimates from this sector.

The Large Pelagic Survey was originally designed to estimate annual recreational catches of bluefin tuna from North Carolina through Massachusetts in the summer months on a weekly basis (primarily for small and medium bluefin) and to evaluate abundance trends of bluefin by monitoring catch and effort associated with all sizes of bluefin in the handgear fishery. Although it was designed for bluefin, the Large pelagic survey collects catch information on other HMS at certain times and in certain areas. There are two phases to this survey: 1) dockside interviews

and observation to obtain number, species, and sizes of fish caught during a trip; and 2) a telephone survey directed at those people likely to be active in the HMS fishery to obtain the amount of effort during the prior reporting period.

In 1992, the Large Pelagic Survey was redesigned to focus on the need for within-season monitoring of recreational catches of bluefin relative to a quota. This was done by increasing the frequency of the reporting period, increasing both dockside and telephone sampling frequency and expanding the areas and times of monitoring and focusing the sampling in the times and areas most important for the bluefin catch estimation. These data are also used to estimate catch information for other HMS, including Atlantic billfish, and to monitor catch-per-unit-effort trends for all HMS within the range of the survey.

In addition to these surveys, the SEFSC conducts a charterboat survey in the southeast for monitoring catch-per-unit-effort trends. This fishery encounters HMS fairly frequently. A NMFS pilot program to supplement data collection in the charterboat fishery in the Gulf of Mexico includes a telephone survey of charterboat operators and a logbook panel survey of charterboat operators. This supplemental survey will be conducted through August 1998, in cooperation with the Gulf States Marine Fisheries Commission, the Alabama Department of Conservation and Natural Resources, the Florida Department of Environmental Protection, the Louisiana Department of Wildlife and Fisheries, and the Mississippi Department of Marine Resources. NMFS will evaluate catch and effort data collected by these two new methods along with data collected by the existing MRFSS survey in the Gulf of Mexico. The charterboat study will determine the relative accuracy of the estimates, survey costs, cooperation of captains and anglers, and reporting burden on the industry.

2.3.3 Recreational Tagging Programs

All release and recapture data collected by the Southeast Fisheries Science Center's Cooperative Tagging Center (CTC) are made available to ICCAT. The CTC is a continuing joint research effort by scientists, and recreational and commercial fishermen that is designed to provide information on the movements and biology of HMS through the direct participation of the public. NMFS has established Internet access for communication between the CTC database and other agencies or countries to facilitate high speed transfer of tagging data to and from other tagging programs, with the intent to establish the CTC as the central depository for HMS release and recapture information. In the eastern Atlantic and Mediterranean Sea, an ICCAT tag recovery program was established in 1997, with coordinators appointed for key geographic locations throughout the area.

Recently, tagging technology has progressed to create fish tags equipped with small computers that can store information on changes in location and temperature for years at a time. Although these archival tags are costly, the information content of a single tag is much greater than that associated with traditional tagging methods. The ability to trace the travels of an

individual fish may lead to better determinations of stock units for HMS management. Archival tags also facilitate behavioral studies that investigate the physiological and environmental preferences of HMS.

As part of the comprehensive plan for HMS monitoring and research, NMFS scientists will enhance cooperative partnerships to develop new systems that optimize the release and recapture of tagged HMS. Future research sponsored by the agency is likely to include tag performance experiments, improved tag and attachment anchor design, and modification of reporting protocols to improve recapture information. In addition to their important implications for stock structure, new tagging technology and field and laboratory experiments will provide NMFS with additional data to support the estimation of HMS life history parameters. These improved tagging efforts will also be useful in future investigations of post-release survival rates for HMS in both commercial and recreational fisheries.

2.3.4 Monitoring and Reporting Commercial Fisheries

An Atlantic billfish (including blue marlin, white marlin, west Atlantic sailfish and longbill spearfish) harvested from its management unit (Section 1.3) may not be purchased, bartered, traded, sold or offered for sale in any state (50 CFR 644.24; and 50 CFR 635.31(b)). In 1991, Atlantic billfish regulations were amended to prohibit the possession of related species, including black marlin (Makaira indica), striped marlin (Tetrapturus audax) and shortbill spearfish (Tetrapturus angustirotris). However, it is allowable for a billfish or related species landed in a Pacific state to remain in the state of landing, or to be possessed by any dealer or processor who subsequently receives or possesses the Pacific billfish, provided the fish is accompanied by a Certificate of Eligibility for Billfishes (COE). The COE documentation certifies that the accompanying billfish was harvested from outside its management unit or that the related species was harvested from outside the Atlantic Ocean. A COE is considered completed and approved for trade if all of the required information is provided, including: (1) name and homeport of the vessel harvesting the billfish or related species; (2) the port and date of offloading from the vessel; and (3) a statement signed by the dealer or seafood processor attesting that each billfish was harvested from an area other than its management units and each related species was harvested from other than the Atlantic Ocean.

Vessel Permitting

Currently all commercial vessels that hold HMS permits are required to display the official number of the vessel so as to be clearly visible from an enforcement vessel or aircraft. NMFS does not intend to amend these regulations, as they are useful for enforcement purposes. Vessel permits for commercial and recreational vessels targeting Atlantic tunas (Atlantic bluefin, yellowfin, bigeye, albacore, skipjack, and bonito [commercial only]) must be renewed on an annual basis. NMFS has issued approximately 20,000 Atlantic tuna vessel permits under an automated permitting system that was implemented in 1997.

Annual permits are also required for U.S. commercial vessels fishing for swordfish and for those commercial vessels fishing for Atlantic sharks in the U.S. Exclusive Economic Zone (EEZ). The HMS FMP implements a two-tiered limited access permit system for directed and incidental longline fishing based on current and historical participation in these fisheries. The limited access program will require pelagic longline vessels targeting tunas or swordfish to have tuna, shark, and swordfish permits (either directed or incidental.) Longline vessels targeting sharks must have a shark permit (either directed or incidental.) The limited access program is intended to stabilize the fleet size and provide an opportunity for NMFS to collect data, conduct studies, and work cooperatively with constituents to develop a flexible, and permanent, effort control program. See Chapter 4 for a detailed description of the limited access program for HMS.

Observer Coverage

Scientific observer coverage of the U.S. pelagic longline fleet was initiated by the NMFS in 1992. Contracted and NMFS observers collect catch data aboard pelagic longline vessels fishing in the waters of the northwest Atlantic Ocean, Gulf of Mexico, and Caribbean Sea. An ICCAT recommendation requires five percent observer coverage of vessels fishing for yellowfin and bigeye tunas. Selection of U.S. vessels is done randomly, with selection based on the fishing vessel performance information provided through mandatory pelagic logbooks. The NMFS' Southeast Fisheries Science Center and NMFS' Northeast Fisheries Science Center successfully recorded effort from 652 sets during 1994, 699 sets during 1995, 362 sets during 1996, and 460 sets during 1997. Observers from the NMFS' Southeast Fisheries Science Center have recorded over 50,000 fish (primarily swordfish, tunas, and sharks), marine mammals, turtles, and seabirds during this time period.

2.3.5 Cooperative Agreements with States

In order to facilitate the collection of fisheries data, NMFS has established cooperative agreements with many of the Atlantic and Gulf of Mexico coastal states, Puerto Rico, and the U.S. Virgin Islands to collect fishery statistics. The cooperative agreements do not impose a specific method of data collection for the landings statistics. The states have implemented various procedures that are consistent with their management and regulatory needs to collect these data. The states, however, are bound to provide the landings data as monthly summaries by species by dealer with the county where the product was landed and the area where it was caught. The states are obligated to provide these data within 60 days from the end of each calendar month.

A number of states are expanding their data collection programs to include tagging of HMS. Cooperation with state agencies, universities and constituents, within the various states, on tagging of highly migratory species is opportunistic and varies from year to year. Shark tagging is often carried out through the states under contracts to investigate early life history stages and

inshore fishing effort on the smaller sharks. The NMFS coordinated tagging effort on bluefin tuna and billfish requires a tagging kit (50CFR Ch.II; 285.27). Several state agents, and U.S. Coast Guard personnel are aware of this requirement and assist in the distribution of tagging kits from time to time.

2.3.6 Databases to Support Management Decisions

Section 401 of the Magnuson-Stevens Act requires the Secretary of Commerce to work with key stakeholders to develop a proposal for implementing a nationwide fishing vessel registration system and fisheries information collection system. This system will integrate all fishery-dependent data systems required under applicable federal statutes and regulations. One of the primary objectives is to reduce the burden on fishermen and other industry participants that collect fisheries data. Existing programs, systems and infrastructure investments will be utilized to the extent possible.

While the comprehensive fisheries information and vessel registration systems will be coordinated across regions, they will also be designed to recognize the unique characteristics of regional fisheries. The new systems should improve NMFS' ability to aggregate harvest data into national summary-level data. Multiple, independent regional information management systems that currently lack a common or overarching framework will soon be linked. The Atlantic Coastal Cooperative Statistics Program (ACCSP), a cooperative state-federal program designed to improve the collection and management of marine and coastal fisheries data, is implementing a pilot information management system and other regions are engaged in similar strategic planning. The mission of the ACCSP is to cooperatively collect, manage, and disseminate fishery statistical data and information for the conservation and management of fishery resources for the Atlantic coast and to support the development and operation of a national program. Information on the ACCSP program was provided to a joint session of the HMS Advisory Panel and Billfish Advisory Panel.

The recently established Core Statistics Program at NMFS has also played a significant role in shaping the fisheries information proposal and will continue to be an integral component of the comprehensive system. The fisheries information initiative will seek to establish data quality standards for accuracy and timeliness that are acceptable to all data providers and information managers. The NMFS Division of Fishery Statistics and Economics already maintains several databases that contain information on the value and volume of U.S. commercial landings, wholesale prices, and trade data. Future surveys will improve the collection of information on the costs and earnings of commercial and recreational fishing vessels. These data are important for making allocation decisions and for understanding the consequences of management alternatives on the fishing industry. NMFS believes that the new system will build public confidence in the agency's ability to collect fisheries information in the most efficient and effective manner possible.

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